February 1991

PROGRESS

Burlington Northern Railroad/Livingston Environmental Cleanup

By Montana Department of Health and Environmental Sciences

What's happening at the site

Mission Wye area private wells clean

In November, MDHES sampled nine private wells in the Mission Wye area to determine if Mission Wye contaminants had migrated to wells at nearby homes. The samples were analyzed by the MDHES chemistry laboratory for volatile organic compounds. None of the wells showed any contamination.

BN to begin Mission Wye investigations

Consultants for Burlington Northern have submitted their revised Mission Wye Work Plan and expect to begin investigation activities in February, depending on the weather. Field work will include sampling of groundwater monitoring wells, investigation of groundwater in the area, aerial photograph analysis and a local water use survey.

BN's waste water barrels freeze

Contaminated waste water from purging and decontamination activities stored in barrels at the railyard froze during December's cold weather causing some of the barrels to bulge and crack. Envirocon thawed the frozen water and put it in new containers packed in steels drums. The water is currently stored at the Forest Products Building adjacent to the BN rail yard.

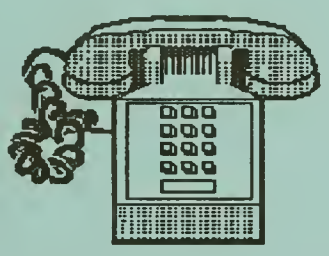
Centrifuge and filter press tests continue

Cold weather affected the centrifuge and filter press tests for sludge treatment taking place at the on-site waste water treatment plant. Envirocon installed a heat source and resumed testing in mid-January. The centrifuge and filter press equipment are new technologies to deal with dehydration of these hazardous wastes as a method of pretreatment.

Work Plans:

On-Site Material Screening (Addendum 9-1)

MDHES has approved this work plan which employs the use of a soil gas probe and air pump to obtain soil gas samples at depths of approximately three to 12 feet. A hollow steel



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probe is driven into the soil at desired depths and an air pump is attached to the probe to extract a vapor sample. Samples will be analyzed for volatile organic compounds (VOCs). These compounds have been detected previously in soil and groundwater on and off the railyard property.

The equipment will be used as a screening tool to identify unknown sources of contaminants on-site. If additional source areas are discovered, MDHES may require BN to drill additional monitoring wells or dig test pits to confirm and refine the screening data.

Test Cell 3 (Addendum 14-7)

MDHES has approved this work plan which summarizes BN's further attempt to recover diesel fuel from Livingston groundwater. The test will last 10-30 days. This third test cell is located east of the on-site WWTP. Groundwater will be pumped from the pumping well and re-injected into an infiltration trench 150 feet up-gradient from the pumping well. This process may increase groundwater and diesel fuel flow toward the recovery well. At the recovery well diesel will be removed with a skimmer pump.

Another purpose of Test Cell 3 is to evaluate whether an air diffusion unit can remove chlorinated compounds from the groundwater before that water is re-injected into the ground. Groundwater will be pumped into a large treatment tank; air will be pumped into the bottom of the tank to increase volatilization of chlorinated chemicals. During testing, volatiles will be emitted to the atmosphere. To determine whether an increased health risk exists during the test, Burlington Northern was required to perform an air quality impact analysis. MDHES reviewed and approved this abbreviated health risk assessment which demonstrates that acceptable EPA health risk standards (less than one in 1,000,000 excess cancer deaths) are met during the test. Any final remedies considered will have to comply with federal, state and local environmental laws and regulations.

New Site Documents

MDHES has recently placed the following documents in the site document repositories for the Livingston site. Repositories are located at the Livingston Public Library, MSU Renne Library, the MDHES office in Helena, the University of Montana Library in Missoula and the State Library in Helena.

Track Pan Installation Soil Removal, by Envirocon, Dec. 14, 1990: This report summarizes soil removal activities and partial results of soil sampling taken during Montana Rail Link's track pan installation in 1990. Soils removed during this operation were stored on liners and covered with plastic by Envirocon. The soils are located on-site, awaiting disposal or treatment by BN.

September 1990 Monthly Groundwater Sampling Results, by Envirocon and October 1990 Monthly Groudwater Sampling Results, by Envirocon: These reports summarize results of monthly groundwater sampling conducted at monitoring wells in and around the Livingston Rail Yard.

December 1990 Monthly Status Report, by Envirocon: This report summarizes site work conducted by BN's consulting firm, Envirocon, at the Livingston site.

600 copies of this public document were published at an estimated cost of .25441 per copy, for a total cost of 152.65 which includes 39.65 for printing and 116.96 for distribution.

May 1991

PROGRESS

Burlington Northern Railroad/Livingston Environmental Cleanup

By Montana Department of Health and Environmental Sciences

What's happening at the site

Private wells still sought

MDHES is conducting a survey of private wells in the area east of "G" Street and between Gallatin and Lewis streets in Livingston. MDHES cataloged all wells identified to date and sampled most wells. The survey and sampling results will tell MDHES if private wells in that area may be contaminated. MDHES is uncertain whether all well owners in the defined area (see map on page 3) have responded to letters MDHES sent out in March. Well owners in the area should know that if they have not yet responded to the MDHES letter or if they did not receive a letter, they are encouraged to contact either the MDHES Helena or Livingston offices: Helena - 1-800-648-8465, Livingston - 222-6120 ext. 277 in the city/county building.

Pancreatic Cancer Study update

Dr. Leslie Hutchinson of the Agency for Toxic Substances and Disease Registry returned to Livingston in early April to conduct final record review in his pancreatic cancer study. Hutchinson said he cannot release preliminary results of his study but will release final study results at a public meeting in Livingston May 29.

Mission Wye activities

In February, the Montana Department of Health and Environmental Sciences (MDHES) began overseeing Burlington Northern Railroad field investigation work at

Cont. on page 2

BN inventories wastes stored at railyard

BN's consultant, Envirocon, recently completed an inventory of wastes being stored at the Livingston site. These wastes are the result of a number of investigation activities. All of the wastes listed below will have to be treated and/or disposed of at a future date.

Water:

Water wastes stem primarily from the drilling, development and purging of monitoring wells. Other waste water is from the centrifuge/filter press operations.

Total = 130 barrels and approximately 97,000 gallons in tanks (64,000 gallons in the tanks will be treated under a waste water quality permit).

Soil:

Waste soils are primarily the result of drill cuttings (the soil taken out of the ground during well drilling) and sub-surface soil samples. Waste soils also include samples returned from laboratories after analysis.

Total = 18 barrels and 21 soil bags (soil bags are approximately 1/3 full).

Diesel product:

Waste diesel originated from the groundwater recovery activities at Test Cells I, II and III.

Total = approximately 360 gallons.

Misc. wastes:

Miscellaneous debris includes oil/sludge-stained wastes, sorbants for oil and liquid cleanup, and waste oils.

Total = 19 barrels and 2 soil bags.

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Mission Wye. Mission Wye is an area east of Livingston used by BN for disposal of railyard wastes including acid-clay sludges and shop wastes. Work so far has included soil borings and installation of three special wells that will aid in determining local groundwater characteristics. On March 25, BN's consultant, ReTec, also began soil gas surveys and test pits to help identify the extent of and magnitude of buried wastes. Sludges from the excavated pits were collected and analyzed for volatile and semi-volatile organic compounds, metals, pH and leachability of metals. Three monitoring wells previously drilled at Mission Wye were sampled and analyzed for volatile and semi-volatile organic contaminants and heavy metals.

Other site work included a geophysical survey in March to help determine whether buried drums or other metal objects are present in the disposal area. Other geological testing will help define the edges of the waste areas and extent of underground contamination. Early this summer, BN's consultant will drill additional monitoring wells.

Sludge treatment

At the Livingston railyard, sludge treatment using the centrifuge and filter press operations was completed at the end of January. Approximately 60,000 gallons of sludge has been treated. Approximately 15,000 gallons of the remnant sludge cake from the centrifuge and filter press is stored in a metal tank to await further treatment. Seven thousand gallons was treated using the filter press in late March and 9,000 gallons of heavy sludge solids still await tests for stabilization and solidification. Envirocon plans on processing the estimated 62,000 gallons of centrate and filter press waste water and surge tank water through the Livingston Rebuild Center's (LRC) waste water treatment plant. This water will be treated under an MPDES water quality permit granted to LRC by MDHES (permit #MT-0000388). After this treatment is complete, no more BN wastes will be treated under the LRC permit. BN is applying for a new permit which will be released for public comment later this year.

Test Cell 3

Test Cell 3 is complete and approximately 69 gallons of diesel product has been recovered. About 3.5 million gallons of groundwater was treated through an air diffusion unit and reinjected to the aquifer. Preliminary results have shown that an average of 38 percent of chlorinated ethenes can be removed from groundwater with this system. MDHES and Envirocon are currently investigating a hydrocarbon recovery system — the fourth and final study.

Railyard actvities

Recent actvities at the railyard include geophysical surveys for locating buried pipelines and tanks (possible contaminant sources), and investigation of the nature and extent of possible buried sludges and the C&P Packing Plant.

New Site Documents

MDHES has recently placed the following documents in the site document repositories for the Livingston site. Repositories are located at the Livingston Public Library, MSU Renne Library, the MDHES office in Helena, the University of Montana Library in Missoula and the State Library in Helena.

Remedial Investigation Work Plan II, Mission Wye , MT , by ReTec, March 1991: This report outlines activities to be conducted by BN's consulting firm, ReTec at the Mission Wye site.

November 1990 Quarterly Groundwater Sampling Results, by Envirocon and December 1990 Monthly Groudwater Sampling Results and January 1991 Monthly Groundwater Sampling Results, by Envirocon: These reports summarize results of groundwater sampling conducted at monitoring wells in and around the Livingston Rail Yard.

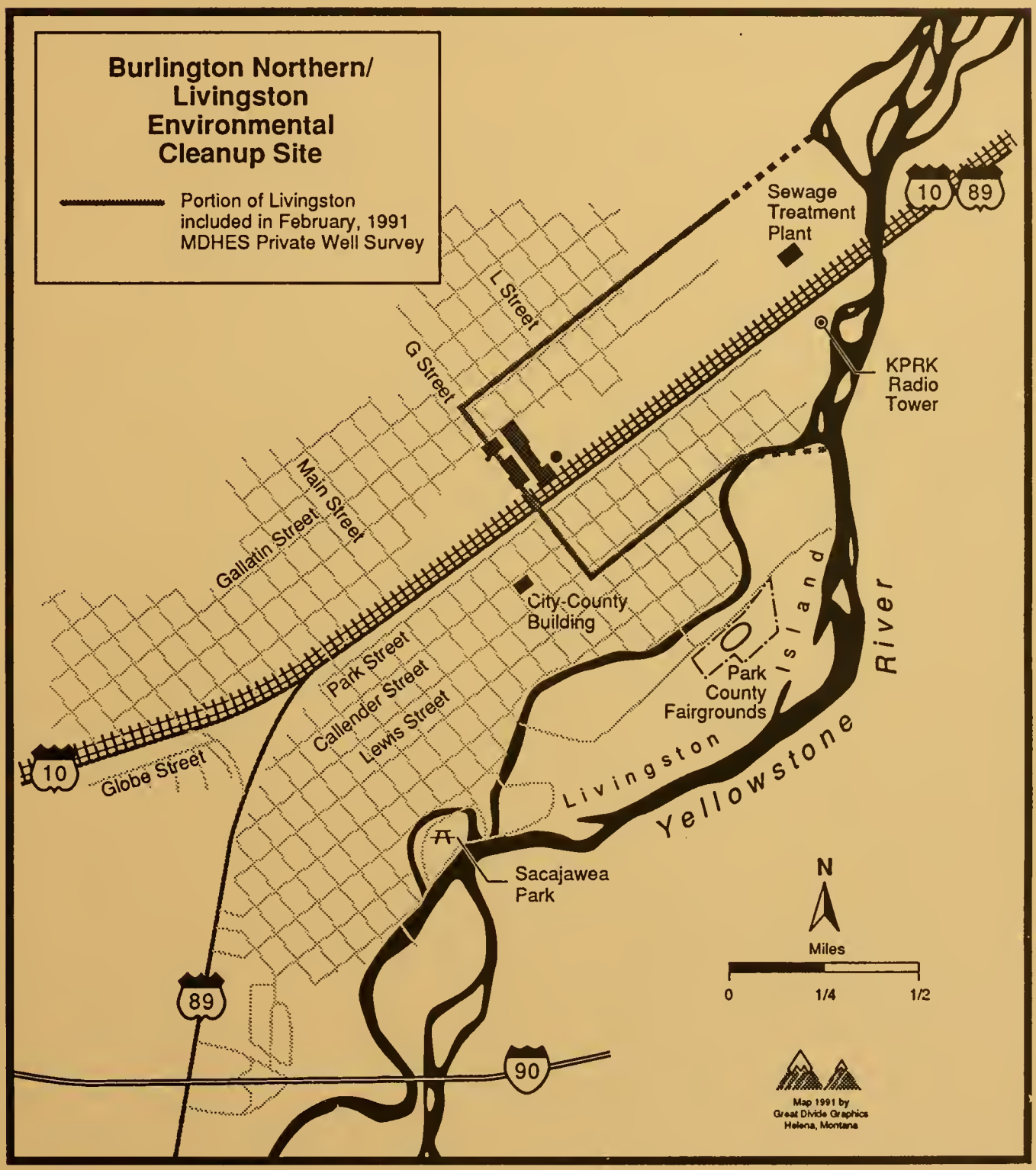
January 1991 and February 1991 and March 1991 Monthly Status Report, by Envirocon: This report summarizes site work conducted by BN's consulting firm, Envirocon, at the Livingston site.

Revisions to the August 1990 Quarterly Groundwater Sampling Results Report, by Envirocon, March 1991: This report corrects reported results for well 89-1. The original results reported less than 0.5 parts per billion of tetrachlorocthylene. The revised results showed 2.4 parts per billion of tetrachloroethylene.

Ambient Air Monitoring Report, by Bison Engineering, April 1991: This document reports results of air monitoring conducted in Livingston.

May 1989 through May 1990 Yearly Quality Assurance/Quality Control Report, by Envirocon, March 1991: This report evaluates Envirocon's air, water, soil, sludge and sediment sampling activities within and around the Livingston rail yard. Both field and laboratory activities are examined. Quality assurance is a system for ensuring that all information, data, and resulting decisions compiled under a specific task are technically sound, statistically valid and properly documented. Quality control is the mechanism through which quality assurance achieves its goals.

Well survey area



Are you on our mailing list?

If you wish your name to be added to or deleted from the mailing list for the BN/Livingston site, or if you wish to update your address, please fill out, detach, and mail the following form to Janie Stiles, Montana Department of Health and Environmental Sciences, Cogswell Building, Helena, MT 59620.

Name _____

Affiliation (optional) _____

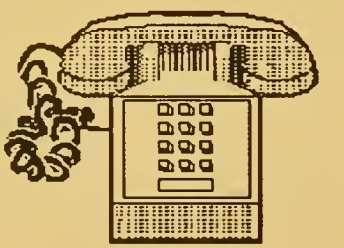
Address _____

City, State _____

Zip _____

If you receive this progress report by mail, there is no need to complete this form, unless you wish to have your name removed from the list or have your address changed. If so, please check below.

Remove ____ Change____



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October 1991

PROGRESS

Burlington Northern Railroad/Livingston Environmental Cleanup

By Montana Department of Health and Environmental Sciences

Public health assessment process underway

Summary of health assessment:

This year, the Agency for Toxic Substances and Disease Registry (ATSDR) began work on a public health assessment for the Burlington Northern/ Livingston Environmental Cleanup site. ATSDR is a section of the federal Public Health Service in Atlanta, Georgia, and will work with the Montana Department of Health and Environmental Sciences (MDHES) and Livingston residents. The health assessment is the result of a petition submitted to ATSDR by the City-appointed Livingston Informed Friends of the Environment. All sites proposed for the National Priority List of Superfund sites require a complete health assessment.

On Thursday, Oct. 24, at 7 p.m., MDHES and ATSDR will hold a public meeting in the District Courtroom of the Livingston City/County Building to discuss the health assessment and the results of a pancreatic cancer study.

What is a health assessment?

A health assessment specifically addresses community health concerns and evaluates relevant information about community health. ATSDR defines a health assessment as follows: "*A health assessment is the evaluation of data and information on the release of hazardous substances into the environment in order to assess any current or future impact on public health, develop health advisories or other recommendations, and identify studies or actions needed to evaluate and mitigate or prevent human*

Cont. on page 2

Study shows increase in pancreatic cancer in Livingston : 1980-1989

Results of a pancreatic cancer study on Park county showed an increase in the disease in white males in Livingston from 1980 to 1989, but officials have not yet determined the cause of the increase. However, based on information obtained so far, age and incidence of smoking do not appear to explain the increase.

Dr. Leslie Hutchinson of ATSDR who conducted the study will present the findings of his draft report at the public meeting Oct. 24 (see page 3). So far, ATSDR has only preliminary information to share with the public. ATSDR is looking into options for further study of the pancreatic cancer issue.

ATSDR initiated the pancreatic cancer study when MDHES requested the federal agency become involved in health issues and concerns raised by the public in response to investigation of the BN/ Livingston site.

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Health assessment

Cont. from page 1

health effects."

ATSDR is using three primary sources of information to conduct the health assessment:

1 Environmental data: This includes information about environmental contamination and routes (pathways) by which contamination may reach the residents of the community. Much of this information is provided by MDHES from past investigations of the Livingston site including thePhase I Remedial Investigation. ATSDR, while visiting Livingston, may collect additional information.

2. Community health concerns: While in Livingston, ATSDR will gather information from the community about their health concerns. ATSDR will gather information from the community during the public meeting Oct. 24 at 7 p.m. but also plans to hold private one-on-one discussions with residents who are reluctant to discuss health concerns in public (please see related section "Public encouraged to take part in activities"). The public may call Jane Stiles toll-free at MDHES in Helena and she will give ATSDR a message to return the call. The toll-free number in Helena is 1-800-648-8465 and is in operation 8 a.m. to 5 p.m. weekdays.

3. Health outcome data: ATSDR reviews what is known as "health outcome data" which may include any number of the following: medical and death records, death data, tumor and disease registries and birth certificates.

Why conduct a health assessment?

A health assessment has three primary purposes:

1. Evaluate public health implications of a site
2. Address the public health implications by developing health advisories or making recommendations about further health or environmental studies
3. Identify populations where actions are necessary to mitigate or prevent adverse health effects.

How is the health assessment conducted?

Every health assessment has six steps which may be conducted in almost any order.

1. Evaluate information about the site's physical, geographical, historical and operational setting
2. Identify health concerns of the affected community
3. Determine the contaminants of concern at the site
4. Identify and evaluate routes by which residents may come in contact with site contaminants.
5. Determine how the contaminants may affect public health
6. Make conclusions and recommendations concerning the health threat posed by the site

What is the result of a health assessment?

The public health assessment will be summed up in a report which will be available for public review and comment. The report is intended to provide information not only to the affected community but also to other involved government agencies. A health assessment report is not always a single, static document, but may be a series of reports over time that reflect the collection and evaluation of information as it
becomes available.

The public health assessment may serve any or all of the following purposes:

1. Identify knowledge gaps concerning the toxicity of contaminants at the site
2. Identify contaminants where biologic measurements of the human exposure or medical investigations are needed
3. Identify the need for additional health information.

ATSDR may then choose to begin a variety of health studies based on the results of the health assessment. The health assessment report may contain recommendations about further actions.

How does a health assessment differ from a risk assessment?

MDHES will soon begin a risk assessment for

the Livingston site. A risk assessment is a required step in the Superfund process and differs from a public health assessment. MDHES will closely coordinate the two studies so no efforts are duplicated. A risk assessment focuses primarily on chemical-specific estimates of risk that a site poses to public health. Conclusions of the risk assessment are considered in establishing site cleanup goals.

Public encouraged to take part in activities

The Montana Department of Health and Environmental Sciences (MDHES) encourages members of the Livingston community to get involved in the public health assessment and to also review of the Draft Pancreatic Cancer Study. Information from the public is a basic component of the health assessment. There are a number of ways the public can have input in both activities..

Public meeting:

MDHES and ATSDR will hold a public meeting at 7 p.m., Thursday, Oct. 24, in the District Courtroom of the Livingston City/County Building. ATSDR will discuss the pancreatic cancer study findings, the public health assessment process and community health concerns. ATSDR will answer questions and receive comments about both studies.

Private meetings with residents:

Livingston residents may meet privately with ATSDR to discuss their health concerns. The appointments will last up to half an hour and are provided for residents who cannot attend the public meeting or who feel reluctant to discuss their health concerns at the public meeting Oct. 24. The meetings will be held from 9 a.m. - Noon , Thursday, Oct. 24 in Livingston. To make an appointment, please call MDHES public information officer Jane Stiles in Helena at 1-800-648-8465. If a resident is unable to attend during the hours listed, Stiles will make other arrangements. Names of people attending these one-on-one meetings will be kept strictly confidential. Anyone not wishing to give their name may identify themselves by number for their appointment. Unless otherwise requested, only the resident and ATSDR representatives will attend the private meeting.

Telephone contact with ATSDR and MDHES:

Residents who prefer to discuss health issues by telephone may reach ATSDR by contacting Jane Stiles in Helena at 1-800-648-8465. Stiles will call ATSDR and arrange for them to return the call.

Comment about the pancreatic cancer study:

The public comment period will begin Oct. 24 and end Nov. 25. Comments should be sent to John Wadhams, MDHES, Cogswell Building, Helena, MT 59620. MDHES will forward all comments to ATSDR.

Are you on our mailing list?

If you wish your name to be added to or deleted from the mailing list for the BN/Livingston site, or if you wish to update your address, please fill out, detach, and mail the following form to Janie Stiles, Montana Department of Health and Environmental Sciences, Cogswell Building, Helena, MT 59620.

Name _____

Address _____

City, State _____

Zip _____

PANCREATIC CANCER and a PUBLIC HEALTH ASSESSMENT IN LIVINGSTON

will be discussed at a public meeting
Thursday, October 24
7 p.m.
Courtroom of City/County Building

Dr. Leslie Hutchinson of the Federal Agency for Toxic Substances and Disease Registry will present the findings of his pancreatic cancer study. The study has concluded that there was an increase in pancreatic cancer in Park County from 1980 to 1989. Tim Hampton of the same agency will be on hand to discuss the ATSDR health assessment process for the BN/Livingston Environmental Cleanup site. Dr. Hutchinson will also meet individually with members of the public from 9 a.m. to noon, Thursday, Oct. 24. These meeetings will be strictly confidential. To make an appointment with Dr. Hutchinson, please contact Jane Stiles in Helena at 1-800-648-8465 or 449-4067 at the Montana Department of Health and Environmental Sciences.

Meeting sponsored by the Montana Department of Health and Environmental Sciences

November 1991

PROGRESS

Burlington Northern Railroad/Livingston Environmental Cleanup

By Montana Department of Health and Environmental Sciences

What's happening at the site

A Draft Remedial Investigation (RI) Report for the Burlington Northern/Livingston Environmental Cleanup site is now in a 60-day public comment period. This report was prepared by Burlington Northern Railroad consultant Envirocon, Inc. of Missoula, Montana. The Interim Remedial Measures Work Plan (IRMWP) of 1989 written by Envirocon, and approved by MDHES guided the investigation.

The Montana Department of Health and Environmental Sciences (MDHES) oversees activities at the BN/Livingston site and is currently reviewing the draft report. The information contained in the report will help MDHES and the public come to a final decision about a site remedy.

The RI Report is meant to serve as the complete collection of data which characterizes site conditions and describes the nature and extent of the contamination. Studies and field tests conducted to evaluate potential cleanup or treatment technologies will be presented in later feasibility study (FS) reports. MDHES will conduct the baseline risk assessment which is related to the remedial investigation to assess the risk site contamination poses to human health and the environment. All these documents will be used to determine final cleanup remedies.

MDHES strongly encourages the public to become familiar with the findings of the remedial investigation. The public comment period on the RI Report began October 1, 1991 and will end December 2, 1991. Comments should be sent to John Wadhams, MDHES, Cogswell Building, Helena, MT 59620. Copies of the report are on file in the Livingston Public Library, the Montana State University Library in Bozeman and at the State Library in Helena.

The draft report is divided into five areas of concern:

1. Sludge
2. Soils
3. Groundwater - diesel fuel
4. Groundwater - solvents
5. Air

This progress report provides a brief, non-technical summary of each area of concern or media. For more detailed, technical information the public is encouraged to read the report.

Get involved

The Draft Remedial Investigation Report summarized in this progress report is a major step at the BN/Livingston Environmental Cleanup site. MDHES will provide comments about the report to BN and ask for additional information where necessary. MDHES strongly encourages the public to become involved with the review and comment of this report. Copies of the draft report may be found at the Livingston Public Library, the Montana State University Library and at the State Library in Helena. The 60-day comment period on the draft document ends December 2, 1991. Please send your comments to Project Manager John Wadhams, Montana Department of Health and Environmental Sciences, Cogswell Building, Helena, MT 59620. If you have questions about the report, you may contact Wadhams at 1-800-648-8465 in Helena, through the Superfund/CECRA hotline.

MDHES keeps extra copies of all progress reports printed so far. To obtain any or all back issues, contact public information officer Jane Stiles at the above phone number or address.

In the coming months, BN will revise this draft of the Remedial Investigation Report and submit the final draft document for public review and comment. During that comment period, MDHES will hold another public meeting and will also hold an official public hearing to take oral and written public comment.

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Sludge

Sludge, which is a mixture of petroleum hydrocarbons, solids, metals and other compounds are found at several locations on the site. Contaminants often found in sludge include volatile and semi-volatile organic compounds, metals and petroleum hydrocarbons. The volatile organic compounds (primarily chlorinated) came from shop complex solvents. The semi-volatile organic compounds are commonly found in diesel fuel. Metals result from engine wear and are found in waste oils and lubricants. Metals found on-site include arsenic, barium, cadmium, chromium, lead mercury, silver and selenium. The total volume of sludge at the Livingston railyard exceeds 5,500 cubic yards.

Sludge at the BN/Livingston site

Location	Volume (cubic yards)
API separator pond	1,200
Cinder pile lagoon	1,050
Overflow pond	2,500
Waste water treatment plant sump	610
In-line grit chamber	10
Waste water treatment plant surge tank	10
Waste water treatment plant grit chamber	60
Waste water treatment plant grit chamber cake	80
TOTAL	5,520

(Envirocon table - Draft RI 1991)

Separator ponds

Before 1946, waste water from the railyard drained directly into the Yellowstone River. In 1946, the railyard built the American Petroleum Institute (API) separator ponds located at the east end of the railyard and at that time adjacent to Gallatin Street. The ponds were designed to float oil to the top, where it would overflow into the pond below. Water at the bottom of the ponds drained to the river, via a drainline. The oily waste which accumulated became heavy and sludge-like. The sludge in the API separator pond (1,200 cubic yards) has been contained in a polyethylene liner. The sludge in the overflow pond (2,500 cubic yards) is buried under four feet of soil, in an area measuring 75 by 300 feet.

Waste water treatment plant

In 1968, when the railroad built the waste water treatment plant, they dug a pit to contain sludge from the plant. This pit is the waste water treatment plant sump. In 1990 BN contained this sludge in a liner. This area currently holds 610 cubic yards of sludge.

The waste water treatment plant grit chambers held 60,000 gallons of sludge and water. BN conducted a sludge treatment test which extracted 32,000 gallons of water which resulted in 16,000 gallons of "sludge cake". The remaining 12,000 gallons of sludge was too heavy for water extraction and was left in the grit chamber. The sludge cake is currently stored in an above-ground tank at the railyard. The water was treated and discharged into the Yellowstone River.

Sludge from cleaning the waste water treatment plant surge tank is now stored in 53 55-gallon barrels at the railyard.

Cinder pile lagoon

Another area where sludge has been contained is located atop of the cinder pile. This sludge was generated from waste water treatment plant processes. Approximately 1,050 cubic yards of sludge is stored there. More uncontained sludge is buried throughout the cinder pile. During the 1980s, BN took some sludge from the cinder pile lagoon to be incinerated at the Park County incinerator.

In-line grit chamber

A small in-line grit chamber located west of the waste water treatment plant contains approximately 10 cubic yards of sludge. A grit chamber is an area designed for solids to separate from liquids before reaching the waste water treatment plant. This concrete structure about 10 feet square and 10 feet deep is known to leak.

Does the BN/Livingston site leave you wondering?
If you have questions, comments or concerns about site activities, call the MDHES Superfund/CECRA toll-free hotline, 8 a.m. to 5 p.m. weekdays, except holidays
1-800-648-8465

Air investigation

In Livingston, the wind blows primarily from the west at a wind speed averaging 15 miles per hour. The air investigation for the BN/Livingston site was divided into two sections.

Ambient air

Ambient air is the outdoor atmosphere and is greatly affected by local weather. Potential ambient air contamination at the BN/Livingston site may be the result of existing site conditions, site remedy activities, current railyard operations, and off-site sources not associated with the railyard. Ambient air is monitored with the use of stationary sampling equipment located upwind and downwind of the railyard. Work zone air monitoring is conducted using portable sampling equipment located within and immediately adjacent to work zones established around the site boundary and investigation areas.

Work zone air: Air sampling pumps were located upwind and downwind or at point sources within the work zones. "Point sources" are sources of potential air contamination that were monitored during work activities such as moving sludge or drilling wells. Work zone air was monitored for particulates, volatile organic compounds and polynuclear aromatic compounds. The following work zones were sampled at various times during the remedial investigation: waste water treatment plant sump sludge removal, separator pond sludge removal, cinder pile sludge removal, drilling of monitoring wells, sludge treatment testing, and cinder pile asbestos.

The work zone investigation revealed particulates slightly above detection limits in five of 13 samples in both upwind and downwind monitors. BN found napthalene, a chemical constituent of diesel fuel, and volatile organic compounds during sludge isolation activities.

Site-wide ambient air: The site-wide program was designed to measure particulate contamination blowing off the railyard. This system also measured polynuclear aromatic hydrocarbons and metals. Results of this test showed air quality appeared to be within state and federal standards.

Indoor air

Indoor air is the air in residential buildings. Indoor air contamination may be the result of ambient air contaminants, soil gases and household products. MDHES and BN conducted indoor air monitoring at various private residences at different times of the year using a variety of sampling and analysis techniques. Samples were analyzed for chlorinated ethenes and volatile organic compounds associated with petroleum products found at the site. At this time, indoor air sampling results are inconclusive. MDHES is currently commenting on a BN basement gas monitoring plan. Sampling is expected to take place during winter and summer 1992 in homes located over the solvent plume to determine if solvent vapors are entering basements.

We want to hear from you

Public input is vital to the site remedial investigation and cleanup process. MDHES values the ideas, thoughts and concerns of the Livingston community. Until Dec. 2, 1991, MDHES will accept public comments about the Draft Remedial Investigation Report for the BN/Livingston Environmental Cleanup site. Please send your written comments to John Wadhams, Montana Department of Health and Environmental Sciences, Cogswell Building, Helena, MT 59620. Copies of the report are available at the Livingston Public Library, the MSU Library in Bozeman and at the State Library in Helena.

Trouble reading the maps?

In the interest of space, we reduced the maps in this progress report. If you have trouble reading them, we will be happy to send you original size copies. Please contact MDHES public information officer Jane Stiles in Helena, toll-free

1-800-648-8465, weekdays from 8 a.m. to 5 p.m.

Soils

The primary purpose of the soils investigation was to locate subsurface soils which contribute to groundwater contamination. Surface soil contamination is not part of this investigation; it will be presented in the final RI report.

Early activities conducted in relation to soils contamination included the 1988 and 1989 removal of 13 underground storage tanks containing primarily diesel fuel. BN also conducted a soil gas survey in 1988 in an effort to determine migration pathways of chlorinated ethenes and potential source areas of volatile organic compounds (petroleum-based compounds which basically evaporate or volatilize easily). The survey results were not conclusive.

Soil investigations included digging 113 test pits in 17 areas suspected to have contaminated soils. The test pits ranged from one to 15 feet in depth. Natural soils in the railyard are primarily gravel extending downward as deep as 60 feet to bedrock. Groundwater was occasionally encountered during test pit excavation. Overall, the soils investigation revealed that similar contaminants existing in the sludge are also found in soils: volatile and semi-volatile organic compounds, petroleum hydrocarbons (including diesel and lubrication oils) and metals.

Drainline from shops to Yellowstone River

As summarized in the section about sludge, a drainline ran from the railyard shops to the Yellowstone River. The first line was installed in 1883 and was made of vitrified-tile pipe. BN dug four test pits along this original line. No contamination was found.

After 1943, the railroads installed a new line, which was a 21-inch reinforced concrete and vitrified tile-pipe extending from the shops to the separator ponds. This line was in use until 1986. BN dug 12 test pits along this post-1943 line and found contamination including solvents and petroleum-based compounds. When excavating the channel from the separator ponds to the river, BN found gravels stained with petroleum and also found a sheen on the groundwater. The area of stained soil is as thick as three feet in an area 10 feet wide by 900 feet long, equaling 850 cubic yards of soil.

Shop complex drainlines

A network of drainlines runs under the shop complex to the waste water treatment plant. Lines which received the heaviest use were investigated. BN dug 23 test pits and collected 24 soil samples. Manways were found to be the primary contaminant source areas along the drainline system and contained volatile and semi-volatile organic compounds and petroleum hydrocarbons. Manways leaked at their base or at connections of lines. Visible soil contamination around manways extends radially as much as eight feet. BN has replaced all but one of these manways and has installed vapor extraction systems plumbing at some manways.

The drainlines appeared to be in good condition with little evidence of leaking, although BN found some contamination. The drainline around the in-line grit chamber had obvious contamination. Contamination was found up to 30 feet from the grit chamber.

Shop complex

Soils were found to be widely contaminated around the vapor degreaser vat in the electric shop. The vapor degreaser cleaned engines with a tetrachloroethene-saturated vapor. This process used approximately 12,000 gallons a year. The highest contaminant levels were found where the tetrachloroethene was stored. The volume of contaminated soil in this area has not been estimated.

Waste water treatment plant

In October 1969, the waste water treatment plant began removing suspended solids, oil, grease and fuel from waste water originating at the shop complex. The system was not designed to remove volatile organic compounds from the waste water.

Envirocon dug 18 test pits around the waste water treatment plant. They found contamination extending as far as

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Name _____

Affiliation (optional) _____

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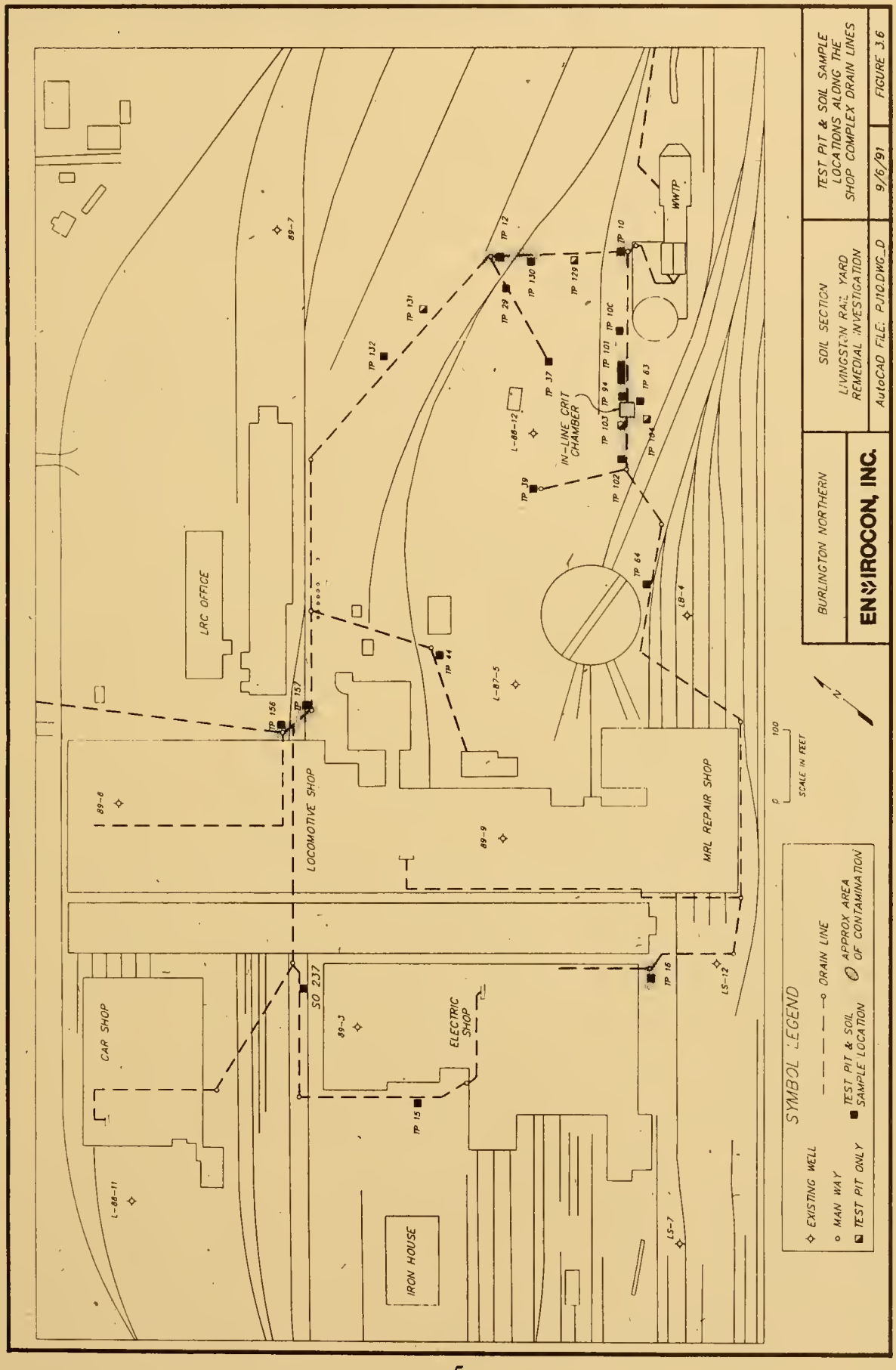
City, State and Zip _____

Map - Railyard shop area drainlines, test pits and sample locations



Soils, cont.

six feet from from cracks in the walls of the grit chambers which held sludge. BN also found a ten- by three-foot area of contamination around leaking drainlines.

Under the waste water treatment plant sump, BN estimated petroleum-stained soils, as deep as 12 feet (to the level of groundwater) to be 1,400 cubic yards. They also discovered a layer of sludge seven-and-a-half feet below the ground surface between the waste water treatment plant sump and building.

Church Universal and Triumphant (CUT) facility

No contamination was located in this area.

Livestock car cleanout area

Beginning in 1942, the railroad disposed of manure and floor covering in an area toward the east end of the railyard known as the livestock car cleanout area. BN dug seven test pits in this area and found nitrate soil contamination which was expected in light of the manure present.

Former waste oil reclamation plant

The railroad reclaimed used engine oil from 1955 to 1978. The reclamation process used sulfuric acid. The acid/oil mixture was then put through a clay absorbent filter. The waste resulting from this process was an acidic clay-based sludge, most of which was disposed of at the Mission Wye area east of Livingston. The Mission Wye area is being investigated under a separate remedial investigation. The remaining waste was disposed of near the reclamation plant, where BN has uncovered hardened sludge. Volatile and semi-volatile compounds were found in this area. Further investigation in this area may be necessary to determine the extent of contamination.

Separator and overflow ponds

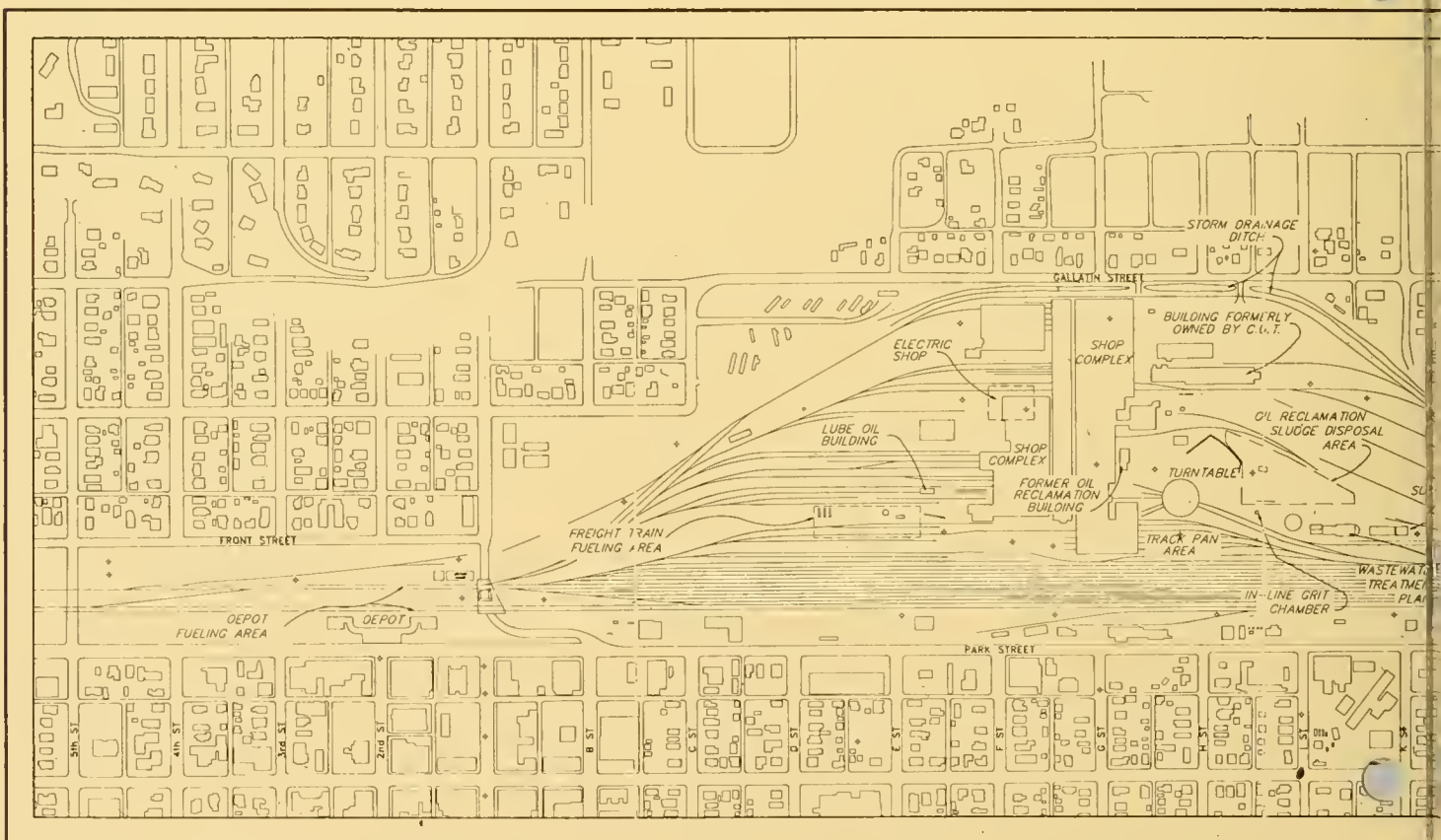
The operation of these ponds is described in the previous "Sludge" section. Envirocon dug 12 test pits, took eight soil/gas samples, and discovered layers of sludge up to three feet thick buried four feet deep. Soil contamination extends as far as 500 feet to Gallatin Street and totals 6,500 cubic yards.

Cinder pile

The railroads disposed of "bottom ash" from steam engines beginning in the mid-1940s in an area east of the shop complex, which became known as the cinder pile. The pile became a disposal area for various shop wastes. The railroads previously disposed of cinders along the railroad right-of-way. The cinder pile contains approximately 130,000 cubic yards of cinders. Other wastes in the cinder pile include buried sludge (an area 80 by 60 feet), hardened sludge 160 by 25 feet), asbestos and miscellaneous shop wastes. Asbestos found on the surface of the cinder pile has been removed.

Depot fueling facility

The depot fueling facility was used for the fueling of freight and passenger trains. Under an order from MDHES, BN



Map - Soils investigation sampling areas

removed underground storage tanks from this area and some visibly contaminated soils. BN dug 12 test pits in this area and collected 12 samples. Diesel fuel contamination exists in this area.

Passenger train fueling area

Under an order from MDHES, BN removed underground storage tanks from this area and adjacent visibly contaminated soils. BN found visibly contaminated soils as deep as 12 feet in this area. The extent of contamination in this area has not been determined.

Freight train fueling area and facility

Under an order from MDHES, BN removed underground storage tanks from this area and 480 cubic yards of adjacent visibly contaminated soils. BN found this area widely contaminated with fuels resulting from leaking fuel lines and human error (spills). Visible soil contamination is deeper than eight feet and extends 200 feet to the east. This area was the major source of diesel contamination of groundwater at the site.

C&P Packing disposal pits

Excavated for gravels during the 1940s and 1950s, these pits were later used for the disposal of animal slaughter wastes as well as domestic and railroad refuse and the roundhouse foundation. During the construction of the API separator ponds in 1969 it was reported that sludge was disposed of in these gravel pits. The investigation has not located this sludge. C&P Packing currently uses the pits as a septic drainfield.

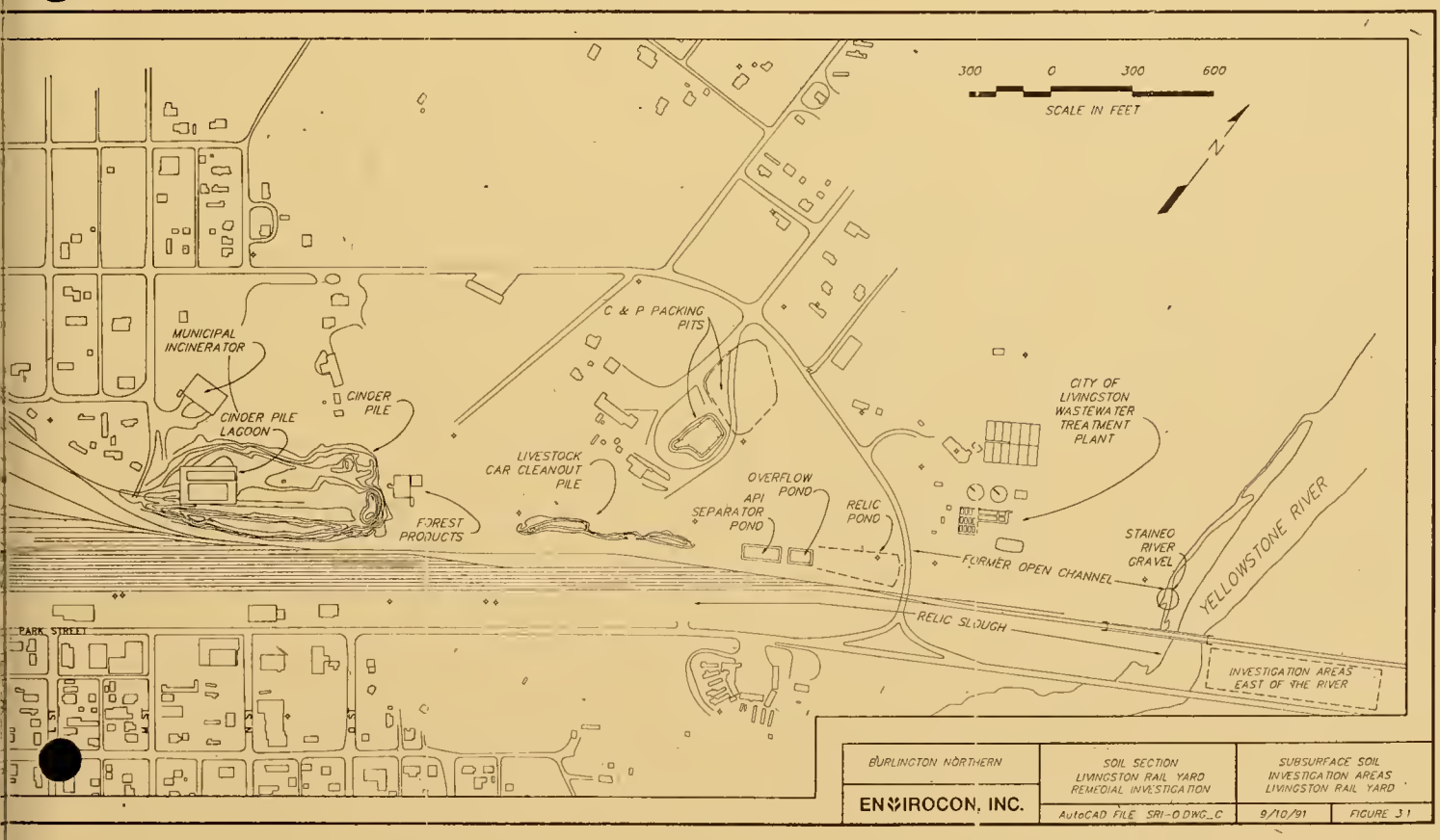
Yellowstone River gravel and sediment

A discharge of oily wastes occurred in January 1990 from the old discharge line. In February and March 1990, Envirocon removed surface gravel which was visibly contaminated as a result of the unauthorized discharge. During the removal, further areas of stained gravel were found. Samples of the contaminated gravel revealed the presence of 2-chlorotoluene, xylene and petroleum. A subsequent investigation of the area did not find these stained gravels.

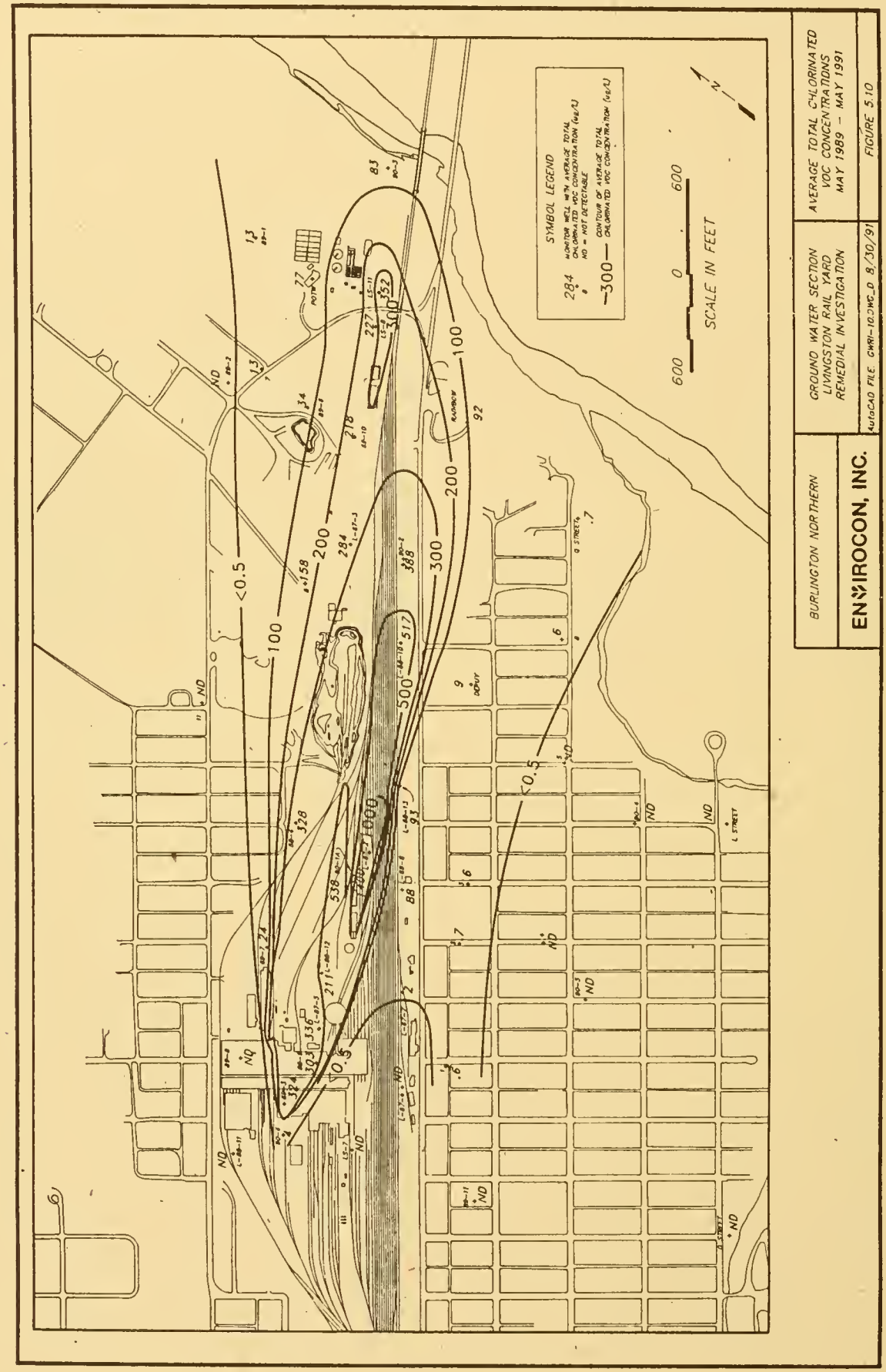
Envirocon sampled river sediment in four locations: one at the discharge from the City of Livingston waste water treatment plant, two downstream from that point and one upstream from that point. Toluene was found in all four samples; the source has not yet been determined.

Track pan installation area

In October 1990, Montana Rail Link installed track pans near the east side of the diesel shop. The pans are designed to collect oil and fuel drippings from idling locomotives. BN dug 38 test pits and collected 16 samples. They found the top 14 inches of ballast stained with petroleum and soil as much as three feet below the ballast. BN removed 300 cubic yards of contaminated soils before MRL installed the new track pans; however, contamination remains in the sub-soils.



Map - Solvents in groundwater at the BN/Livingston site



Groundwater - solvent contamination

The soils underlying the Livingston area are highly permeable and made up of sandy and gravelly materials. The thickness of the groundwater ranges up to 65 feet and averages 20 feet. Groundwater tends to follow the Yellowstone River, flowing northeast under the Livingston railyard. It is from this groundwater that the City of Livingston takes its municipal water at a rate between 800,000 and 4,000,000 gallons per day.

Solvents to clean railroad engines became popular in the 1950s. At the Livingston site, solvents and cleaners were spilled or leaked directly onto the ground or leaked from the industrial waste water lines running under the railyard and from sludge disposal areas. The primary source areas of solvents are the shop complex, the waste water treatment plant area, drainlines and the separator ponds. Other source areas also exist. The solvents, also known as volatile organic compounds, are found in the groundwater contamination plume extending northeast across the railyard toward and into the Yellowstone River. Most of the plume contains concentrations of contaminants at less than 200 parts per billion, but concentrations as high as 2,850 parts per billion have been detected.

The primary contaminants found in ground water include tetrachloroethene, trichloroethene, cis- and trans-1,2 dichloroethene, 2-chlorotoluene, chlorobenzene, 1,2-dichlorobenzene and 1,4-dichlorobenzene. These contaminants can dissolve in groundwater. Groundwater investigation activities included the following as outlined in the work plan:

1) Monthly, quarterly and yearly groundwater sampling of 49 monitoring, four municipal and four private wells

2) Monthly groundwater and Yellowstone River elevation monitoring

3) Aquifer investigation

4) Bedrock and hydraulic properties investigation

5) Yellowstone River water and sediment sampling

The purpose of the groundwater sampling program was to identify the vertical and horizontal extent of dissolved groundwater contaminants, define seasonal concentration variations within the solvent plume and provide a database to help measure cleanup activities.

Shop area

The shop area includes three primary chlorinated volatile organic compound sources:

1) Northwest corner of the electric shop which was the location of the tetrachloroethene vapor degreaser used to clean traction motors. PCE has leaked and spilled in this area.

2) Two manways immediately east ot the locomotive shop where wastewater containing chlorinated ethenes apparently leaked at the connections between the drainline and the manway.

3) Manway adjacent to the transfer pit. It is located on the drain line which passes the vapor degreaser pit area.

Waste water treatment plant

Three areas of chlorinated volatile organic compounds exist near the waste water treatment plant:

1) The soil beneath the sump

2) The ground beneath the grit chambers

3) The soil around the in-line grit chamber west of the surge tank

Rain and snow melt washing through contaminated soils in this area carry the contaminants to the groundwater. Because this area overlies the free-product (diesel) plume, these contaminants come in contact with the diesel first. Because these chlorinated volatile organic compounds are more soluble in diesel than in water, they tend to concentrate in the diesel plume

Separator ponds

Background information about the separator ponds can be found in the "Sludges" section of this progress report. Although BN removed some sludge from these ponds and placed it in a lined area, the ground contaminated by sludge leachate and the uncontained sludge in the overflow pond are still in contact with the groundwater and continue to leach contaminants into the groundwater.

Private wells

In 1989, BN sampled 14 private wells believed to lie near or within the solvent plume. Six of these wells contained volatile organic compounds but none of the six are used for drinking water. However, some of the contaminated wells are used for irrigation.

Municipal wells

In April 1988, MDHES sampled Livingston city municipal wells and found contaminants below the drinking water standard in the "Q" and "L" Street wells. Although the contaminant levels were below the national drinking water standard, the City of Livingston discontinued using them because of the potential for greater contaminant levels to occur. BN later agreed to drill replacement wells for the city. Subsequent testing of the "Q" and "L" Street wells indicates less contamination.

Yellowstone River water sampling

Envirocon has taken a total of six water samples from the Yellowstone River during the remedial investigation. These locations included three above the railyard discharge line and three below it. No semi-volatile organic compounds or pesticides were found. Volatile organic compounds were found in the sample taken downstream of and closest to the discharge pipe of the Livingston water treatment plant. Small concentrations of arsenic were apparent in all of the river water samples and is

Cont. on page 10

Groundwater - solvents contamination, cont.

believed to occur naturally.

Groundwater - total petroleum hydrocarbons (TPH), metals and nitrates

Dissolved petroleum hydrocarbons from the diesel plume have been detected in the ground water under the railyard. Concentrations range from less than 0.1 to 34 parts per million. Lower concentrations of dissolved metals have been found in some monitoring wells. Wells down gradient from the livestock cleanout pile were sampled for nitrates and found to contain concentrations of nitrate from 0.36 - 3.87 parts per million. The drinking water standard is 10 parts per million.

Groundwater - diesel fuel contamination

The railroads which ran through the Livingston railyard used steam locomotives powered by coal from 1883 until 1947. In 1947, the diesel engine came into use. By 1957, all trains through the railyard were powered by diesel fuel. The railroads installed underground storage tanks for fuel beginning with two 20,000 gallon tanks in 1947 and installed more later. As with other underground storage tanks throughout the U.S., some railyard tanks leaked. Human error (spills occurring from leaving equipment unattended during fueling as well as the overfilling of tanks) also accounted for much of the diesel spilled at the site. The fuel eventually soaked through the soils and onto groundwater and soils at the water table. In fall 1988, MDHES ordered BN to remove 18 fuel storage tanks, associated piping and contaminated soils.

The new hydrocarbon investigation included "free petroleum hydrocarbons" in soils and floating on top of groundwater. The area of investigation was limited to areas within and around the railyard where this "free product" exists. "Free product" is a term used to describe diesel fuel which has migrated to the groundwater surface and is also contained in soil pore spaces near the water surface.

Investigation of hydrocarbons or free product included the following activities as outlined in the work plan:

1) Removal of fuel storage tanks, associated piping and some adjacent contaminated soils

2) Construction of on- and off-site monitoring and observation wells

3) Direct measurement of free-product elevations and thicknesses in monitoring wells

4) Sampling and laboratory analysis of contaminated water and soils

5) Testing of several systems to recover diesel from the groundwater

Under the terms of legal agreements with MDHES, BN installed 40 wells between 1986 and 1991 to monitor the diesel and solvent contamination in the groundwater. MDHES installed nine off-site wells in 1987 during the investigation of an unrelated leaking underground storage tank. Some of these wells are used to monitor contamination from the railyard.

Two separate free product plumes (area of groundwater contamination so named because the shape often resembles a feather or "plume") have existed at the site. Currently, no free product exists at the depot area but soils contain measurable petroleum hydrocarbons (diesel fuel). BN believes there are no sources currently contributing to the diesel plume because all underground fuel storage tanks have been removed. In addition, Envirocon's investigation revealed that the plume is not being carried along at the same rate as the groundwater because of the thickness of the diesel and its physical and chemical characteristics.

Hydrocarbon sheen investigation

During water line construction on East Lewis Street in December 1989, the City of Livingston encountered groundwater which showed an oily sheen. Envirocon performed an investigation to determine the source and extent of this oil. The investigation was inconclusive.

Hydrocarbon recovery tests

BN has conducted five tests of systems designed to recover diesel from groundwater at the site. ReTec performed the first two tests in 1987 and Envirocon performed three tests in 1990 and 1991. Currently, two additional pilot-scale recovery tests are operating. One is attempting to recover diesel fuel from a six-well network. The other system is attempting to use a large trench system for diesel recovery. Information from all these treatability studies will be presented in the feasibility study report.

Freight train plume

The freight train plume extends northeast from the former freight train fueling area. (See "Soils" section for more information) This area represents the major area of petroleum contamination. As much as 30,000 gallons of diesel was pumped daily in this area. The freight train plume covers at least 30 acres and contains an estimated 600,000 gallons of diesel. BN has found an apparent diesel layer greater than one foot on the groundwater in some areas of this plume.

As the groundwater fluctuates up and down with the seasons, diesel in the plume area moves across soils next to the groundwater leaving the soils saturated with diesel. Envirocon found an area of diesel-saturated soil as thick as six feet during installation of monitoring wells. The total volume of

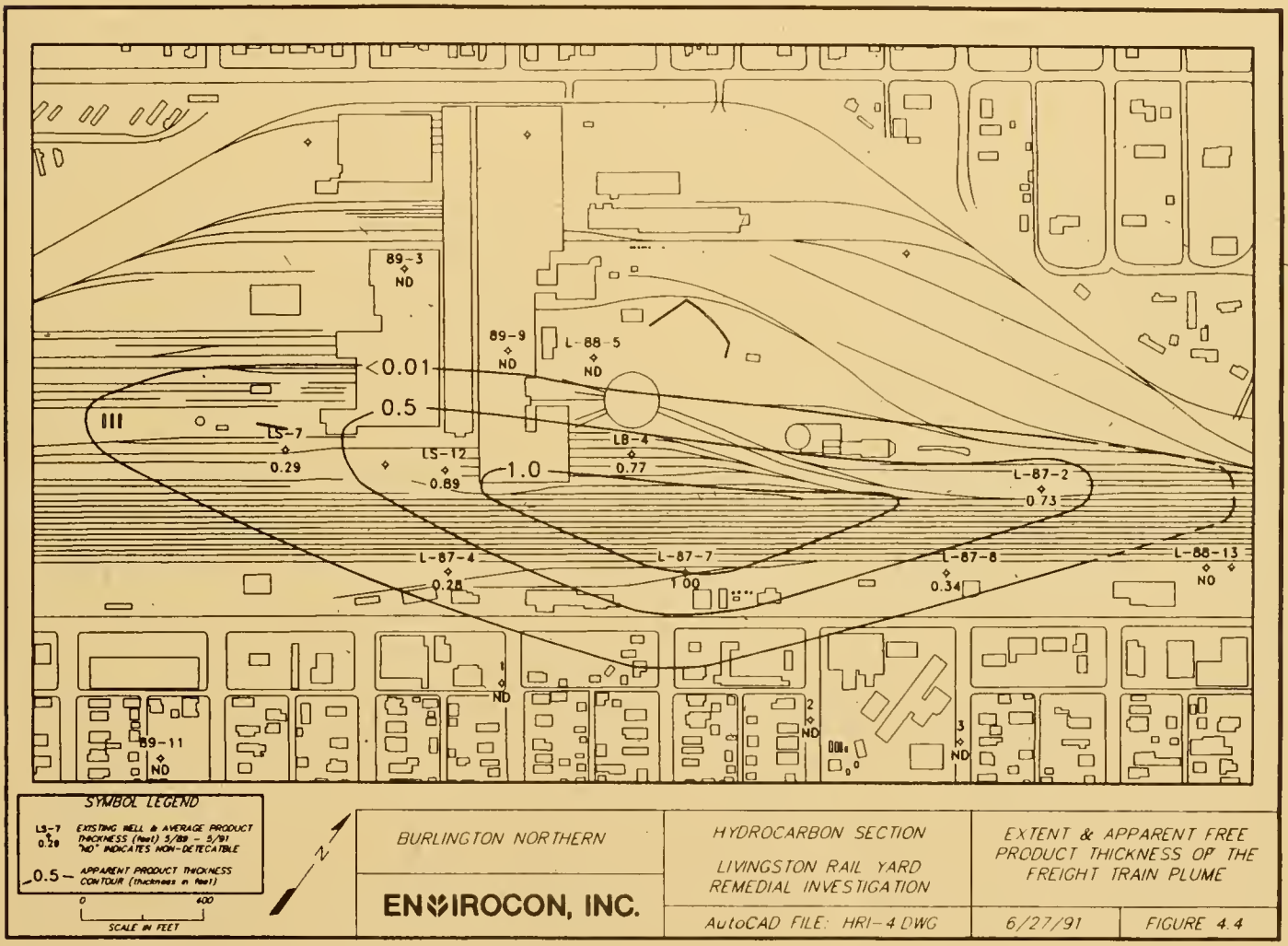
Groundwater - diesel fuels contamination, cont.

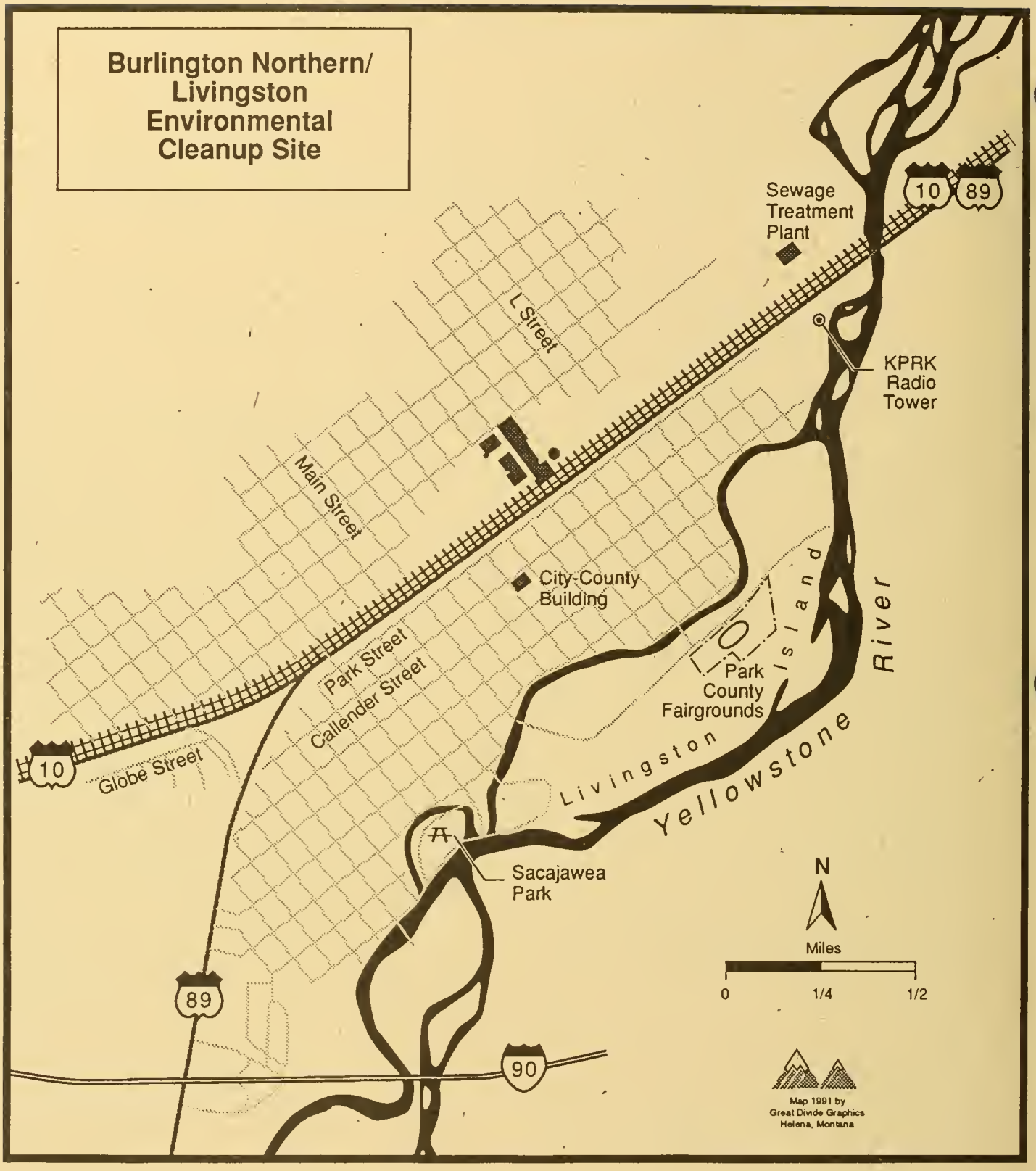
an area of diesel-saturated soil as thick as six feet during installation of monitoring wells. The total volume of contaminated soils within the freight train plume is estimated to be 275,000 cubic yards. In some areas of the diesel plume the diesel contained volatile organic compounds. In other areas of the plume, contaminated soils contained semi-volatile compounds and metals.

The depot area

This contaminated area covers about 10 acres. Investigations have revealed no free product floating on the groundwater in this area. However, BN's study did reveal petroleum in the soil above the water table. Based on an average of five feet of diesel contamination, an estimated 70,000 cubic yards of soils are affected in this area.

Map - Diesel fuel contamination in Livingston groundwater





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